This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A method of selecting paths, comprising ~~the steps of~~:

a) ~~computing~~ determining a plurality of ~~first~~ shortest paths from a source point to a destination point, wherein each shortest path comprises ~~each including of a serial chain of~~ at least one communications link;

b) selecting ~~K~~ a quantity of ~~first~~ shortest paths from the plurality of shortest paths;

c) ordering the selected ~~K~~ quantity of ~~first~~ shortest paths from shortest path length to longest path length;

d) for each selected quantity of ~~first~~ shortest path~~s of K:~~,

i) computing ~~the~~ a cost of ~~the~~ a first shortest path, wherein the cost of the first shortest path is ~~as~~ substantially equal to ~~the~~ a combined cost of ~~the~~communications links included in the first shortest path;

ii) computing an estimated cost of a second shortest path, wherein the estimated cost of the second shortest path is ~~selecting a lowest estimated cost second shortest path from the remainder of the elements of K, where the estimated cost of the second shortest path is computed as~~ substantially equal to ~~the~~ a combined estimated cost of ~~the~~ communication links included in the second shortest path, and wherein the combined estimated ~~and the~~ cost of ~~a~~ each communication link corresponds to ~~the cost of~~ using the link as scaled by a first probability that the link can be shared by the second shortest path and ~~a~~ another path ~~already~~ provisioned using a channel of the link; and

e) selecting ~~the~~ a lowest estimated combined cost of the first shortest path and the second shortest path ~~pair~~.

2. (Currently Amended) The method according to claim 1, wherein for ~~a~~ the second shortest path, the cost of ~~a~~ the link is estimated by~~;~~:

a) assigning ~~an~~ a first infinite cost to a first link included in ~~an associated~~ the first shortest path;

b) assigning ~~an~~ a second infinite cost to a second link that traverses at least one shared -risk-group (SRG) traversed by ~~an associated~~ the first shortest path;

c) assigning to a third link not having an available shared protection channel a third cost substantially equal to the cost of allocating an additional shared protection channel to the link;

d) estimating for a fourth link having at least one available shared protection channel a cost corresponding to the cost of using the link scaled by a second probability that the link can be shared by the second path under consideration and no backup paths already provisioned using the link.

3. (Original) The method of claim 2 wherein the probability that the link can be shared by the second path under consideration and no backup path already provisioned using the link is determined according to a method comprising;

a) creating a variable M, and assigning as its value the number of available shared protection channels in the link;

b) for each j from 1 to N;

i) creating an array of N elements , SRG_j, consisting of the N SRGs traversed by a proposed primary path;

ii) creating an array of N elements, n_j, consisting of the number of times SRG_j is traversed by a primary path protected by a backup path already provisioned using channels of the link;

c) computing a probability, p, that one available shared protection channel of a link can be shared by a second shortest path and one backup path already provisioned using the channel as $p=\Pi_j(1-n_j/M)$, for j from 1 to N;

d) computing a probability, P, that no available shared protection channel of a link can be shared by a second shortest path with a backup path already provisioned using a channel of the link as $P=(1-p)^M$.

4. (Original) The method according to claim 1, wherein the lowest cost path pair is selected according to a method comprising;

a) defining an array of K elements, w_i, where i ranges from 1 to K, including the ordered K first selected paths;

b) defining an array of K elements, si, where i ranges from 1 to K, including the K second shortest paths associated with the ordered K first selected paths;

c) defining a set, K, comprised of elements {wi,si}, where i ranges from 1 to K;

d) computing the combined estimated cost of the elements of set K, and ordering the elements from lowest combined estimated cost to highest combined estimated cost;

e) selecting the lowest combined estimated cost path pair in set K.

5. (Currently Amended) A method of selecting paths, comprising ~~the steps of~~:

a) creating a first graph representing a network having a topology ~~containing~~ including network elements interconnected by communications links, wherein each network element is represented by a vertex and each communication link interconnecting adjacent network elements is represented by an edge, the first graph ~~containing~~ including a source vertex corresponding to an ingress network element and a destination vertex corresponding to an egress network element;

b) using the first graph to calculate a plurality of paths between the source and destination vertices;

c) selecting ~~K~~ a quantity of ~~first~~ shortest paths between the source vertex and the destination vertex;

d) for each ~~first~~ shortest path;

i) computing the cost of ~~the~~ a first shortest path;

ii) creating a second graph substantially based on the first graph, wherein the second graph includes edges and estimated edge costs and ~~an~~ a first edge associated with the first shortest path is modified from the first graph;

iii) selecting a lowest estimated cost of a second shortest path from the source vertex to destination vertex from the second graph, wherein the lowest estimated cost of the second shortest path is substantially equal to the combined estimated costs of the edges comprising the second shortest path and the ~~estimated cost of an edge corresponds to the~~ cost of using the edge scaled by a first probability that the edge can be shared by the second shortest path and ~~a~~ another path already provisioned using a channel of the edge; and

e) selecting the lowest estimated combined cost of the first shortest path and the second shortest path ~~pair~~.

6. (Currently Amended) The method according to claim 5, wherein an edge associated with the first shortest path is ~~modified by removing it~~ removed from the second graph.

7. (Currently Amended) The method according to claim 5, wherein an edge associated with the first shortest path ~~is modified by setting its~~ has an estimated edge cost set to a very high value.

8. (Currently Amended) The method according to claim 5, wherein an edge associated with the first shortest path ~~is modified by setting its~~ has an estimated edge cost set to an infinite value.

9. (Currently Amended) The method according to claim 5, wherein the ~~K~~ quantity of the first shortest paths are ordered from a lowest cost to a highest cost ~~and assigned to elements w_i, of set K, where i ranges from 1 to K~~.

10. (Currently Amended) The method according to claim 5, wherein ~~for each first shortest path~~ a least estimated cost second shortest path is chosen from the second graph and for each second shortest path in ~~a~~ the second graph, the cost of ~~a~~ the link is estimated according to a method comprising~~;~~:

i) assigning an infinite cost to ~~an~~ a first edge that traverses at least one SRG traversed by the first shortest path;

ii) assigning to ~~an~~ a second edge without an available shared protection channel a second cost substantially equal to ~~the~~ a third cost of adding an additional shared protection channel to the edge;

iii) estimating for ~~an~~ a third edge having ~~at least one~~ an available shared protection channel, a fourth cost corresponding to ~~the cost of~~ using the third edge scaled by a

second probability that the third edge can be shared by the second path under consideration and no backup paths already provisioned using the edge.

11. (Currently Amended) The method of claim 10, wherein ~~a~~ the probability that ~~an~~ the edge can be shared by ~~a~~ the second shortest path and no backup paths already provisioned using channels of ~~an~~ the edge is estimated by~~:~~:

a) creating a variable, M, and setting its value to the number of available shared protection channels in the edge;

b) for each j, where j ranges from 1 to N~~:~~:

i) creating an array of N elements, SRG_j, consisting of the N SRGs traversed by a proposed primary path;

ii) creating an array of N elements, n_j, each consisting of the number of times SRG_j is traversed by a primary path protected by a backup path already provisioned using channels of the edge;

c) computing ~~a~~ another probability, p, that one available shared protection channel of an edge can be shared by a second shortest path and one backup path already provisioned using the channel as $p=\Pi_j(1-n_j/M)$;

d) computing a probability, P, that no available shared protection channel of an edge can be shared by a second shortest path with a backup path already provisioned using a channel of the edge as $P=(1-p)^M$.

12. (Currently Amended) The method of claim 5, wherein ~~a~~ the lowest estimated combined cost first and second shortest path pair is selected according to a method comprising~~:~~:

a) creating a set, S, with K elements $\{w_i,s_j\}$, where i ranges from 1 to K, including the K first shortest paths, w_i, and K associated selected second shortest paths, s_j;

b) for each first shortest path, w_i, where i ranges from 1 to K;

i) computing a cost substantially equal to the combined cost of the links included in the first shortest path;

ii) computing an estimated cost for the associated selected second shortest path substantially equal to the combined estimated cost of the links comprising the selected second shortest path;

c) ordering the elements of set S from lowest combined estimated cost to highest combined estimated cost;

d) selecting the lowest combined estimated cost path pair.

13. (Currently Amended) A shared mesh protection network, wherein paths are provisioned according to a method comprising~~;~~:

a) generating a list of ~~at least one candidate pair of paths including one~~ primary paths and ~~one~~ associated backup paths between a source network element and a destination network element;

b) selecting a first lowest estimated path pair from the list, where ~~the~~ a first cost of the primary path is substantially equal to ~~the~~ a second cost of ~~the~~ network resources included in the primary path and ~~the estimated~~ a third cost of ~~a~~ the associated backup path corresponds to ~~the~~ a fourth cost of the network resources included in the backup path, scaled by ~~the~~ a first probability that ~~existing~~ the network resources can be shared by the backup path;

c) using signaling to attempt to establish the selected path pair;

d) eliminating the selected lowest estimated path pair from the list, if it can not be established, and attempting to establish a ~~new~~ second lowest estimated cost path pair; and

e) returning an error signal ~~to a network operator~~ if no ~~candidate~~ path pair from the list can be allocated.

14. (Currently Amended) The network of Claim 13, wherein a path provisioning is controlled by the source network element and the signaling is used between the source network element and each network element in ~~a proposed pair of~~ the primary and backup paths to establish links between adjacent network elements.

15. (Currently Amended) The network of claim 14, wherein said signaling ~~is comprised of the steps of ;~~ comprises:

a) for each network element in the primary path, sending from the source network element to the network element a request for the network element to establish a link with adjacent network elements;

b) for each network element in the backup path, sending from a source network element to the network element a request for the network element to establish a link with adjacent network elements;

c) for each network element in the primary path that can not establish a link to an adjacent network element, sending from the network element to the source network element an error signal;

d) for each network element in the primary path that can establish a link to an adjacent network element, sending from the network element to the source network element a valid link signal;

16. (Currently Amended) The network of Claim 13, wherein the network has a single network controller and signaling between the single network controller and the network elements is used to provision the primary and backup paths.

17. (Currently Amended) The network of claim 13, wherein a reallocation of existing network resources is initiated at any time.

18. (Currently Amended) The network of claim 13, wherein a reallocation of existing network resources is initiated at each request of ~~new~~ a communications service.

19. (Currently Amended) The network of claim 13, wherein a reallocation of existing network resources is initiated at regularly scheduled intervals.